

ANALYTICAL REPORT

May 24, 2019

¹Cp

²Tc

³Ss

⁴Cn

⁵Tr

⁶Gl

⁷Al

⁸Sc

Cardno - Newark, DE

Sample Delivery Group: L1093333

Samples Received: 04/27/2019

Project Number:

Description:

Report To: Art Saunders
121 Continental Drive Suite 308
Newark, DE 19713

Entire Report Reviewed By:



Craig Cothron
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



90016000

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ONE LAB. NATIONWIDE.



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Tc: Table of Contents	2	 ² Tc
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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WW-20190426-002-DAY2 L1093333-01 WW

Collected by
Rachel N.
Collected date/time
04/26/19 06:36
Received date/time
04/27/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Subcontracted Analyses	WG1273455	1	05/22/19 00:00	05/22/19 00:00	CBM	Minneapolis, MN 55414

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Craig Cothron
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Project Narrative

L1093333 -01 contains subout data that is included after the chain of custody.



This data package consists of this signature page, the laboratory review checklist, and the following reportable data as applicable:

R1 - Field chain-of-custody documentation;

R2 - Sample identification cross-reference;

R3 - Test reports (analytical data sheets) for each environmental sample that includes:

- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified compounds (TICs).

R4 - Surrogate recovery data including:

- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

R5 - Test reports/summary forms for blank samples;

R6 - Test reports/summary forms for laboratory control samples (LCSs) including:

- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

R8 - Laboratory analytical duplicate (if applicable) recovery and precision:

- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.

R10 - Other problems or anomalies.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Craig Cothron
Project Manager



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

¹Cp²Tc³Ss⁴Cn⁵Tr⁶Gl⁷Al⁸Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

- * Not all certifications held by the laboratory are applicable to the results reported in the attached report.
- * Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia ¹	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky ^{1,6}	90010
Kentucky ²	16
Louisiana	AI30792
Louisiana ¹	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey-NELAP	TN002
New Mexico ¹	n/a
New York	11742
North Carolina	Env375
North Carolina ¹	DW21704
North Carolina ³	41
North Dakota	R-140
Ohio-VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LA000356
South Carolina	84004
South Dakota	n/a
Tennessee ^{1,4}	2006
Texas	T104704245-18-15
Texas ⁵	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

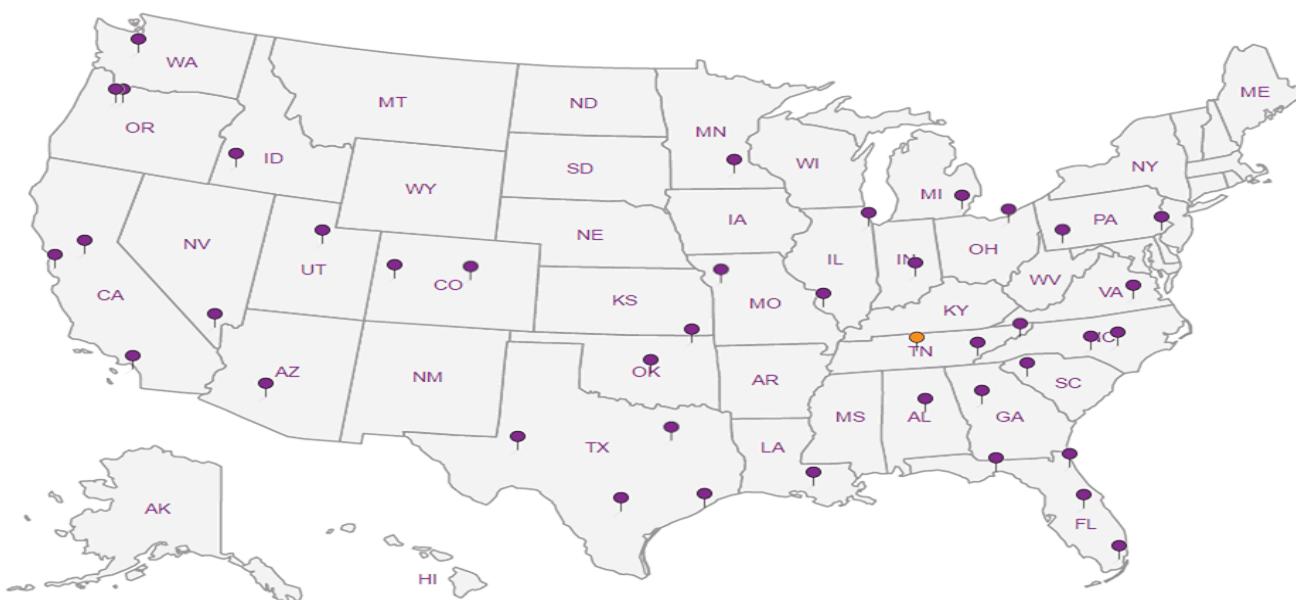
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 ⁵	1461.02
Canada	1461.01
EPA-Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Tr
- ⁶ Gl
- ⁷ Al
- ⁸ Sc

Cardno - Newark, DE

121 Continental Drive Suite 308
Newark, DE 19713Report to:
Art SaundersProject
Description:

Phone: 610-220-3957

Fax:

Collected by (print):

Richard Saunders

Collected by (signature):

MHR

Immediately

Packed on Ice N Y

Billing Information:

Accounts Payable
121 Continental Drive Suite 308
Newark, DE 19713Pres
Chk

Analysis / Container / Preservative

Chain of Custody

Page 1 of 1

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859L# L1093333
B193

Title:

Acctnum: CARDNONDE

Template: T149278

Prelogin: P704877

TSR: 034 - Craig Cothron

PB:

Shipped Via:

Remarks Sample # (lab only)

Client Project #	Lab Project #	City/State Collected:	Date Results Needed		No. of Cntrs
			Same Day	Five Day	
	CARDNONDE-ITC		Next Day	5 Day (Rad Only)	
			Two Day	10 Day (Rad Only)	
			Three Day		
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time
	GW			4/26/19	1326
WW-20190426-002	Day 2 Comp	WW	—	4/26/19	1326
WW-20190426-002	Day 2 Grab	WW	—	4/25/19	1325
					4/27

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:

Samples returned via:

UPS FedEx Courier

pH _____ Temp _____

Flow _____ Other _____

Sample Receipt Checklist
 COC Seal Present/Intact: NP Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 If Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N

Relinquished by : (Signature)

Relinquished by : (Signature)

Relinquished by : (Signature)

Date: 4/26/19 Time: 16:38

Date: 4/26/19 Time: 20:00

Date: Time:

Received by: (Signature)

Received by: (Signature)

Received for lab by: (Signature)

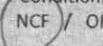
Trip Blank Received: Yes No
HCl MeOH TBR

Temp: 13.5°F C Bottles Received: 33

Date: Time:

If preservation required by Login: Date/Time

Condition: NCF / OK



Cardno - Newark, DE 121 Continental Drive Suite 308 Newark, DE 19713			Billing Information: Accounts Payable 121 Continental Drive Suite 308 Newark, DE 19713			Pres Chk	Analysis / Container / Preservative						Chain of Custody		
															Page <u>4</u> of <u>4</u>
Report to: Art Saunders			Email To: Art.Saunders@cardno.com									Pace Analytical® National Center for Testing & Innovation			
Project Description:			City/State Collected:									12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859			
Phone: 610-220-3957 Fax:		Client Project #		Lab Project # CARDNONDE-ITC											
Collected by (print): <i>Richard Natale</i>		Site/Facility ID #		P.O. #									L#		
Collected by (Signature): <i>R. Natale</i>		Rush? (Lab MUST Be Notified)		Quote #									Table #		
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>		Same Day <input type="checkbox"/> Five Day <input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only) <input type="checkbox"/> Two Day <input checked="" type="checkbox"/> 10 Day (Rad Only) <input type="checkbox"/> Three Day <input type="checkbox"/>		Date Results Needed			No. of Cntrs						Acctnum: CARDNONDE Template: T149278 Prelogin: P704877 TSR: 034 - Craig Cothron PB:		
Sample ID		Comp/Grab	Matrix *	Depth	Date	Time							Shipped Via:		
		GW	WW	—	4/26/19	10:36	36	X	X	X	X	X	X	X	Remarks <input type="checkbox"/> Sample # (lab only)
JW-20190426-002-Days2Comp		WW	—	—	4/26/19	10:36		X	X	X	X	X	X	X	-01
		WW	—	—	4/25/19	1325									
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other		Remarks: Samples returned via: UPS <input checked="" type="checkbox"/> FedEx <input checked="" type="checkbox"/> Courier												pH _____ Temp _____ Flow _____ Other _____	
Relinquished by : (Signature) <i>A. B. Saenger</i>		Date: 4/26/19	Time: 16:38	Received by: (Signature) <i>R. Natale</i>			Trip Blank Received: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> HCl MeOH TBR			Sample Receipt Checklist COC Seal Present/Intact: <input checked="" type="checkbox"/> NP <input type="checkbox"/> Y <input type="checkbox"/> N COC Signed/Accurate: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Bottles arrive intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Correct bottles used: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Sufficient volume sent: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N If Applicable VOA Zero Headspace: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Preservation Correct/Checked: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N RAD SCREEN: <0.5 mR/hr					
Relinquished by : (Signature) <i>R. Natale</i>		Date: 4/26/19	Time: 20:00	Received by: (Signature)			Temp: 13.8 °C Bottles Received: 2.2 + 1 = 3 33			If preservation required by Login: Date/Time					
Relinquished by : (Signature)		Date:	Time:	Received for lab by: (Signature)			Date: 7/27/19 Time: 0800			Hold:		Condition: NCF <input checked="" type="checkbox"/> OK <input type="checkbox"/>			

Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS FOR
PCDD/PCDF**

Report Prepared Date:

May 10, 2019

Report Information:

Pace Project #: 10472822

Sample Receipt Date: 04/30/2019

Client Project #: L1093333: WG1273455

Client Sub PO #: L1093333

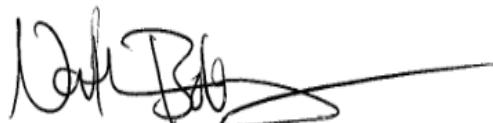
State Cert #: T104704192

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 3 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



May 10, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.



Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analysis performed on one sample submitted by a representative of Pace Analytical National. The sample was analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extract ranged from 73-96%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained. Concentrations below the calibration range were flagged "J" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show that PCDDs and PCDFs were not detected.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 97-122% with relative percent differences of 0.9-11.3%. These results were within the target ranges for the method. Matrix spikes were not prepared with the sample batch.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Report No.....10472822

Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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Report No.....10472822

Report No.....10472822_1613FC_DFR

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

Client Sample ID

WW-20190426-002-DAY2

Pace Sample ID

10472822001

Date Received

04/30/2019

Sample Type

Water

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Report No....10472822_1613FC_DFR

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Pace Analytical National	Report To: Pace Analytical National Subout Team	Attention: Art Saunders		Page : 1 Of 1	
Address: 12065 Lebanon Road	Copy To:	Company Name:			
Mount Juliet, TN 37122		Address:		Regulatory Agency	
Email: SuboutTeam@pacenational.com	Purchase Order #: L1093333	Pace Quote:			
Phone: (615)773-9756	Project Name: N/A	Pace Project Manager: Nathan Boberg		State / Location	
Fax: (615)758-5859	Project #: N/A	Pace Profile #: 38076		DE	
Requested Due Date: 1-May					

Requested Analysis: Filtered (Y/N)

WO# : 10472822



10472822

# ITEM	SAMPLE ID <small>One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique</small>	MATRIX CODE (see valid codes to left)	COLLECTED				SAMPLE TEMP AT COLLECTION	Preservatives							Analyses Test	Residual Chlorine (Y/N)	
			START	END	DATE	TIME		DATE	TIME	# OF CONTAINERS	H ₂ SO ₄	HNO ₃	HCl	NaOH			Na ₂ SO ₃
1	WW-20190426-002-DAY2	WT			26-Apr	6:36	4	4	Unpreserved							X	CDI
2																	
3																	
4																	
8																	
9																	
10																	
11																	
12																	

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Pace Analytical National Batch: WG1273455	Benita Miller	29-Apr	16:49	<i>Ronald Pace</i>	4/30/19	8:50	1.7 Y Y Y

Pace Analytical National SDGs: L1093333

Location: Minneapolis, MN 55414

PFAS/PFOS Method 537 and Dioxin and Furans by method 1613

SAMPLER NAME AND SIGNATURE		TEMP in C
PRINT Name of SAMPLER:		
SIGNATURE of SAMPLER:		
DATE Signed:		

Received on
Ice (Y/N)
Custody
Sealed
Cooler (Y/N)
Samples
In tact (Y/N)



Sample Condition
Upon Receipt

Client Name:

Project #:

WO# : 10472822

PM: NB3

Due Date: 05/14/19

CLIENT: ESC_TN

Courier:

Fed Ex UPS USPS Client
 Pace SpeeDee Commercial see Exception

Tracking Number:

4876 1094 9690

Custody Seal on Cooler/Box Present? Yes No

Seals Intact? Yes No

Biological Tissue Frozen? Yes No N/A

Packing Material: Bubble Wrap Bubble Bags None Other:

Temp Blank? Yes No

Thermometer: T1(0461) T2(1336) T3(0459)
 T4(0254) T5(0048)

Type of Ice: Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: <u>1.7</u> °C	Average Corrected Temp See Exceptions (no temp blank only): <u>1.7</u> °C
Correction Factor: <u>True</u>	Cooler Temp Corrected w/temp blank: <u>1.7</u> °C	

USDA Regulated Soil: N/A, water sample/Other: _____ Date/Initials of Person Examining Contents: HF 4/30/19
 Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, Did samples originate from a foreign source (internationally, including
 ID, LA, MS, NC, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: <u>See Exception</u> <input type="checkbox"/>
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other		
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No pH Paper Lot# <u>See Exception</u> <input type="checkbox"/>
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13. <u>See Exception</u> <input type="checkbox"/>
Trip Blank Present? Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased):

CLIENT NOTIFICATION/RESOLUTION

Person Contacted:

Comments/Resolution: Samples collected in Texas.

Field Data Required? Yes No

Date/Time:

Project Manager Review: Kirsten Hogen

Date: 5/1/2019

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: H

Appendix B

Sample Analysis Summary



Method 1613B Sample Analysis Results

Client - Pace Analytical National

Client's Sample ID	WW-20190426-002-DAY2		
Lab Sample ID	10472822001		
Filename	Y190509A_10		
Injected By	SMT		
Total Amount Extracted	965 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	04/26/2019 06:36
ICAL ID	Y190424	Received	04/30/2019 08:50
CCal Filename(s)	Y190509A_01	Extracted	05/06/2019 12:20
Method Blank ID	BLANK-70325	Analyzed	05/09/2019 14:44

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	---	1.1	2,3,7,8-TCDF-13C	2.00	81
Total TCDF	ND	---	1.1	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	---	0.99	2,3,4,7,8-PeCDF-13C	2.00	73
Total TCDD	ND	---	0.99	1,2,3,7,8-PeCDD-13C	2.00	81
				1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	ND	---	1.8	1,2,3,6,7,8-HxCDF-13C	2.00	85
2,3,4,7,8-PeCDF	ND	---	2.2	2,3,4,6,7,8-HxCDF-13C	2.00	85
Total PeCDF	ND	---	2.0	1,2,3,7,8,9-HxCDF-13C	2.00	88
				1,2,3,4,7,8-HxCDD-13C	2.00	82
1,2,3,7,8-PeCDD	ND	---	2.8	1,2,3,6,7,8-HxCDD-13C	2.00	79
Total PeCDD	ND	---	2.8	1,2,3,4,6,7,8-HpCDF-13C	2.00	92
				1,2,3,4,7,8,9-HpCDF-13C	2.00	83
1,2,3,4,7,8-HxCDF	ND	---	2.6	1,2,3,4,6,7,8-HpCDD-13C	2.00	96
1,2,3,6,7,8-HxCDF	ND	---	2.1	OCDD-13C	4.00	80
2,3,4,6,7,8-HxCDF	ND	---	2.5			
1,2,3,7,8,9-HxCDF	ND	---	2.1	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	---	2.3	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	---	3.0	2,3,7,8-TCDD-37Cl4	0.20	93
1,2,3,6,7,8-HxCDD	ND	---	1.8			
1,2,3,7,8,9-HxCDD	ND	---	2.0			
Total HxCDD	ND	---	2.3			
1,2,3,4,6,7,8-HpCDF	ND	---	1.4	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	---	1.1	Equivalence: 0.00 pg/L		
Total HpCDF	ND	---	1.2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	---	1.8			
Total HpCDD	ND	---	1.8			
OCDF	ND	---	2.8			
OCDD	ND	---	4.1			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

REPORT OF LABORATORY ANALYSIS

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	WW-20190426-002-DAY2		
Lab Sample ID	10472822001		
Filename	Y190509A_10		
Injected By	SMT		
Total Amount Extracted	965 mL	Matrix	Water
% Moisture	NA	Dilution	NA
Dry Weight Extracted	NA	Collected	04/26/2019 06:36
ICAL ID	Y190424	Received	04/30/2019 08:50
CCal Filename(s)	Y190509A_01	Extracted	05/06/2019 12:20
Method Blank ID	BLANK-70325	Analyzed	05/09/2019 14:44

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	1.1	0.10000	0.0000	0.0539	0.1078
Total TCDF	ND	1.1	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	0.99	1.00000	0.0000	0.4959	0.9918
Total TCDD	ND	0.99	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	1.8	0.03000	0.0000	0.0264	0.0527
2,3,4,7,8-PeCDF	ND	2.2	0.30000	0.0000	0.3349	0.6698
Total PeCDF	ND	2.0	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	2.8	1.00000	0.0000	1.3956	2.7912
Total PeCDD	ND	2.8	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	2.6	0.10000	0.0000	0.1323	0.2646
1,2,3,6,7,8-HxCDF	ND	2.1	0.10000	0.0000	0.1048	0.2097
2,3,4,6,7,8-HxCDF	ND	2.5	0.10000	0.0000	0.1249	0.2497
1,2,3,7,8,9-HxCDF	ND	2.1	0.10000	0.0000	0.1071	0.2142
Total HxCDF	ND	2.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	3.0	0.10000	0.0000	0.1490	0.2980
1,2,3,6,7,8-HxCDD	ND	1.8	0.10000	0.0000	0.0876	0.1753
1,2,3,7,8,9-HxCDD	ND	2.0	0.10000	0.0000	0.1013	0.2025
Total HxCDD	ND	2.3	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.4	0.01000	0.0000	0.0068	0.0137
1,2,3,4,7,8,9-HpCDF	ND	1.1	0.01000	0.0000	0.0055	0.0110
Total HpCDF	ND	1.2	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	1.8	0.01000	0.0000	0.0089	0.0178
Total HpCDD	ND	1.8	0.00000	0.0000	0.0000	0.0000
OCDF	ND	2.8	0.00030	0.0000	0.0004	0.0008
OCDD	ND	4.1	0.00030	0.0000	0.0006	0.0012

0.00 pg/L 3.1 pg/L 6.3 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Appendix C

QC and Calibration Results Summary



Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKTA	Matrix	
Lab Sample ID	BLANK-70325	Dilution	Water
Filename	F190509A_04	Extracted	NA
Total Amount Extracted	980 mL	Analyzed	05/06/2019 12:20
ICAL ID	F190508	Injected By	05/09/2019 07:15
CCal Filename(s)	F190508B_19		SMT

Native Isomers	Conc pg/L	EMPC pg/L	EDL pg/L	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.47	2,3,7,8-TCDF-13C	2.00	75
Total TCDF	ND	----	0.47	2,3,7,8-TCDD-13C	2.00	76
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	1.3	2,3,4,7,8-PeCDF-13C	2.00	75
Total TCDD	ND	----	1.3	1,2,3,7,8-PeCDD-13C	2.00	85
				1,2,3,4,7,8-HxCDF-13C	2.00	68
1,2,3,7,8-PeCDF	ND	----	1.2	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	----	0.67	2,3,4,6,7,8-HxCDF-13C	2.00	74
Total PeCDF	ND	----	0.91	1,2,3,7,8,9-HxCDF-13C	2.00	75
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	----	1.5	1,2,3,6,7,8-HxCDD-13C	2.00	66
Total PeCDD	ND	----	1.5	1,2,3,4,6,7,8-HpCDF-13C	2.00	66
				1,2,3,4,7,8-HpCDF-13C	2.00	69
1,2,3,4,7,8-HxCDF	ND	----	0.55	1,2,3,4,6,7,8-HpCDD-13C	2.00	72
1,2,3,6,7,8-HxCDF	ND	----	0.48	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	ND	----	0.36			
1,2,3,7,8,9-HxCDF	ND	----	0.63	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	0.50	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.77	2,3,7,8-TCDD-37Cl4	0.20	99
1,2,3,6,7,8-HxCDD	ND	----	0.77			
1,2,3,7,8,9-HxCDD	ND	----	0.98			
Total HxCDD	ND	----	0.84			
1,2,3,4,6,7,8-HpCDF	ND	----	1.2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	1.1	Equivalence: 0.00089 pg/L		
Total HpCDF	ND	----	1.2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	----	0.90			
Total HpCDD	ND	----	0.90			
OCDF	ND	----	1.5			
OCDD	----	3.0	1.8 IJ			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

J = Estimated value

I = Interference present

REPORT OF LABORATORY ANALYSIS

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2,3,7,8-TCDD Toxic Equivalency (TEQ) Calculations

Pace Analytical National

Client's Sample ID	DFBLKTA				
Lab Sample ID	BLANK-70325				
Filename	F190509A_04				
Injected By	SMT				
Total Amount Extracted	980 mL		Matrix	Water	
% Moisture	NA		Dilution	NA	
Dry Weight Extracted	NA		Collected	05/03/2019 18:38	
ICAL ID	F190508		Received	05/03/2019 18:38	
CCal Filename(s)	F190508B_19		Extracted	05/06/2019 12:20	
Method Blank ID			Analyzed	05/09/2019 07:15	

Parameter	Conc pg/L	RL pg/L	WHO2005	LB	MB	UB
2,3,7,8-TCDF	ND	0.47	0.10000	0.0000	0.0235	0.0471
Total TCDF	ND	0.47	0.00000	0.0000	0.0000	0.0000
2,3,7,8-TCDD	ND	1.3	1.00000	0.0000	0.6311	1.2622
Total TCDD	ND	1.3	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	ND	1.2	0.03000	0.0000	0.0173	0.0346
2,3,4,7,8-PeCDF	ND	0.67	0.30000	0.0000	0.1006	0.2012
Total PeCDF	ND	0.91	0.00000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	ND	1.5	1.00000	0.0000	0.7419	1.4838
Total PeCDD	ND	1.5	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDF	ND	0.55	0.10000	0.0000	0.0274	0.0548
1,2,3,6,7,8-HxCDF	ND	0.48	0.10000	0.0000	0.0241	0.0482
2,3,4,6,7,8-HxCDF	ND	0.36	0.10000	0.0000	0.0179	0.0357
1,2,3,7,8,9-HxCDF	ND	0.63	0.10000	0.0000	0.0313	0.0626
Total HxCDF	ND	0.50	0.00000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	ND	0.77	0.10000	0.0000	0.0387	0.0774
1,2,3,6,7,8-HxCDD	ND	0.77	0.10000	0.0000	0.0386	0.0772
1,2,3,7,8,9-HxCDD	ND	0.98	0.10000	0.0000	0.0491	0.0982
Total HxCDD	ND	0.84	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	ND	1.2	0.01000	0.0000	0.0062	0.0124
1,2,3,4,7,8,9-HpCDF	ND	1.1	0.01000	0.0000	0.0056	0.0112
Total HpCDF	ND	1.2	0.00000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDD	ND	0.90	0.01000	0.0000	0.0045	0.0090
Total HpCDD	ND	0.90	0.00000	0.0000	0.0000	0.0000
OCDF	ND	1.5	0.00030	0.0000	0.0002	0.0005
OCDD	ND	1.8	0.00030	0.0009	0.0009	0.0009

0.00089 pg/L 1.8 pg/L 3.5 pg/L

Final values are valid to only 2 significant figures

TEQs for Totals classes include contributions from non 2,3,7,8 isomers only

LB = Lower Bound, Where "ND", TEQ Conc = 0

MB = Medium Bound, Where "ND", TEQ Conc = (LOD/2) * (TEF Factor)

UB = Upper Bound, Where "ND", TEQ Conc = LOD * (TEF Factor)

RL = Reporting Limit

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-70326	Matrix	Water
Filename	F190509A_01	Dilution	NA
Total Amount Extracted	968 mL	Extracted	05/06/2019 12:20
ICAL ID	F190508	Analyzed	05/09/2019 05:08
CCal Filename	F190508B_19	Injected By	SMT
Method Blank ID	BLANK-70325		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	104
2,3,7,8-TCDD	10	12	6.7	15.8	117
1,2,3,7,8-PeCDF	50	53	40.0	67.0	107
2,3,4,7,8-PeCDF	50	52	34.0	80.0	104
1,2,3,7,8-PeCDD	50	49	35.0	71.0	97
1,2,3,4,7,8-HxCDF	50	54	36.0	67.0	109
1,2,3,6,7,8-HxCDF	50	53	42.0	65.0	106
2,3,4,6,7,8-HxCDF	50	51	35.0	78.0	102
1,2,3,7,8,9-HxCDF	50	53	39.0	65.0	106
1,2,3,4,7,8-HxCDD	50	54	35.0	82.0	109
1,2,3,6,7,8-HxCDD	50	56	38.0	67.0	112
1,2,3,7,8,9-HxCDD	50	55	32.0	81.0	109
1,2,3,4,6,7,8-HpCDF	50	53	41.0	61.0	106
1,2,3,4,7,8,9-HpCDF	50	49	39.0	69.0	99
1,2,3,4,6,7,8-HpCDD	50	51	35.0	70.0	101
OCDF	100	100	63.0	170.0	100
OCDD	100	100	78.0	144.0	103
2,3,7,8-TCDD-37Cl4	10	12	3.1	19.1	118
2,3,7,8-TCDF-13C	100	95	22.0	152.0	95
2,3,7,8-TCDD-13C	100	96	20.0	175.0	96
1,2,3,7,8-PeCDF-13C	100	94	21.0	192.0	94
2,3,4,7,8-PeCDF-13C	100	95	13.0	328.0	95
1,2,3,7,8-PeCDD-13C	100	100	21.0	227.0	105
1,2,3,4,7,8-HxCDF-13C	100	83	19.0	202.0	83
1,2,3,6,7,8-HxCDF-13C	100	88	21.0	159.0	88
2,3,4,6,7,8-HxCDF-13C	100	91	22.0	176.0	91
1,2,3,7,8,9-HxCDF-13C	100	92	17.0	205.0	92
1,2,3,4,7,8-HxCDD-13C	100	83	21.0	193.0	83
1,2,3,6,7,8-HxCDD-13C	100	83	25.0	163.0	83
1,2,3,4,6,7,8-HpCDF-13C	100	82	21.0	158.0	82
1,2,3,4,7,8,9-HpCDF-13C	100	85	20.0	186.0	85
1,2,3,4,6,7,8-HpCDD-13C	100	89	26.0	166.0	89
OCDD-13C	200	140	26.0	397.0	70

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-70327	Matrix	Water
Filename	F190509A_02	Dilution	NA
Total Amount Extracted	985 mL	Extracted	05/06/2019 12:20
ICAL ID	F190508	Analyzed	05/09/2019 05:51
CCal Filename	F190508B_19	Injected By	SMT
Method Blank ID	BLANK-70325		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	106
2,3,7,8-TCDD	10	12	6.7	15.8	120
1,2,3,7,8-PeCDF	50	55	40.0	67.0	109
2,3,4,7,8-PeCDF	50	56	34.0	80.0	112
1,2,3,7,8-PeCDD	50	51	35.0	71.0	101
1,2,3,4,7,8-HxCDF	50	57	36.0	67.0	113
1,2,3,6,7,8-HxCDF	50	53	42.0	65.0	107
2,3,4,6,7,8-HxCDF	50	51	35.0	78.0	103
1,2,3,7,8,9-HxCDF	50	52	39.0	65.0	105
1,2,3,4,7,8-HxCDD	50	56	35.0	82.0	112
1,2,3,6,7,8-HxCDD	50	61	38.0	67.0	121
1,2,3,7,8,9-HxCDD	50	61	32.0	81.0	122
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	111
1,2,3,4,7,8,9-HpCDF	50	52	39.0	69.0	103
1,2,3,4,6,7,8-HpCDD	50	51	35.0	70.0	102
OCDF	100	110	63.0	170.0	105
OCDD	100	100	78.0	144.0	105
2,3,7,8-TCDD-37Cl4	10	11	3.1	19.1	109
2,3,7,8-TCDF-13C	100	77	22.0	152.0	77
2,3,7,8-TCDD-13C	100	78	20.0	175.0	78
1,2,3,7,8-PeCDF-13C	100	75	21.0	192.0	75
2,3,4,7,8-PeCDF-13C	100	76	13.0	328.0	76
1,2,3,7,8-PeCDD-13C	100	86	21.0	227.0	86
1,2,3,4,7,8-HxCDF-13C	100	68	19.0	202.0	68
1,2,3,6,7,8-HxCDF-13C	100	72	21.0	159.0	72
2,3,4,6,7,8-HxCDF-13C	100	76	22.0	176.0	76
1,2,3,7,8,9-HxCDF-13C	100	75	17.0	205.0	75
1,2,3,4,7,8-HxCDD-13C	100	69	21.0	193.0	69
1,2,3,6,7,8-HxCDD-13C	100	64	25.0	163.0	64
1,2,3,4,6,7,8-HpCDF-13C	100	64	21.0	158.0	64
1,2,3,4,7,8,9-HpCDF-13C	100	67	20.0	186.0	67
1,2,3,4,6,7,8-HpCDD-13C	100	72	26.0	166.0	72
OCDD-13C	200	120	26.0	397.0	58

Cs = Concentration Spiked (ng/mL)

Cr = Concentration Recovered (ng/mL)

Rec. = Recovery (Expressed as Percent)

Control Limit Reference: Method 1613, Table 6, 10/94 Revision

R = Recovery outside of control limits

Nn = Value obtained from additional analysis

* = See Discussion

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Method 1613B

Spike Recovery Relative Percent Difference (RPD) Results

Client Pace Analytical National

Spike 1 ID	LCS-70326	Spike 2 ID	LCSD-70327
Spike 1 Filename	F190509A_01	Spike 2 Filename	F190509A_02

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	104	106	1.9
2,3,7,8-TCDD	117	120	2.5
1,2,3,7,8-PeCDF	107	109	1.9
2,3,4,7,8-PeCDF	104	112	7.4
1,2,3,7,8-PeCDD	97	101	4.0
1,2,3,4,7,8-HxCDF	109	113	3.6
1,2,3,6,7,8-HxCDF	106	107	0.9
2,3,4,6,7,8-HxCDF	102	103	1.0
1,2,3,7,8,9-HxCDF	106	105	0.9
1,2,3,4,7,8-HxCDD	109	112	2.7
1,2,3,6,7,8-HxCDD	112	121	7.7
1,2,3,7,8,9-HxCDD	109	122	11.3
1,2,3,4,6,7,8-HpCDF	106	111	4.6
1,2,3,4,7,8,9-HpCDF	99	103	4.0
1,2,3,4,6,7,8-HpCDD	101	102	1.0
OCDF	100	105	4.9
OCDD	103	105	1.9

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	F190508	Data Files:			Time	Injected
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43	SMT	
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02	SMT	
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00	SMT	
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46	SMT	
		CS-5	F190508A_05	13:05	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8288	0.8067	0.8548	0.9247	0.8692
2,3,7,8-TCDD		0.7258	0.7466	0.9053	0.8472	0.8226
1,2,3,7,8-PeCDF		0.7848	0.8155	0.9265	0.9294	0.9605
2,3,4,7,8-PeCDF		0.9141	0.9583	1.0049	1.0616	1.0418
1,2,3,7,8-PeCDD		0.7512	0.7742	0.8516	0.8895	0.8836
1,2,3,4,7,8-HxCDF		1.0236	1.1127	1.1608	1.1726	1.2089
1,2,3,6,7,8-HxCDF		1.0014	1.0246	1.1187	1.1501	1.1270
2,3,4,6,7,8-HxCDF		1.0507	1.1409	1.1858	1.2495	1.2346
1,2,3,7,8,9-HxCDF		0.9781	1.0316	1.0873	1.1379	1.1166
1,2,3,4,7,8-HxCDD		0.8555	0.8687	0.9233	0.9402	0.9573
1,2,3,6,7,8-HxCDD		0.8314	0.9043	0.9052	0.9359	0.9026
1,2,3,7,8,9-HxCDD		0.8565	0.8763	0.9003	0.9266	0.9153
1,2,3,4,6,7,8-HpCDF		1.1049	1.1654	1.1997	1.2823	1.2449
1,2,3,4,7,8,9-HpCDF		1.1387	1.1656	1.2257	1.2892	1.2353
1,2,3,4,6,7,8-HpCDD		0.8917	0.9372	0.9719	1.0276	1.0178
OCDF		0.9256	0.9767	0.9981	1.0986	1.0703
OCDD		0.8835	0.9641	0.9292	0.9824	0.9725
Total PeCDF		0.8494	0.8869	0.9657	0.9955	1.0012
Total HxCDF		1.0134	1.0775	1.1381	1.1775	1.1718
Total HxCDD		0.8478	0.8831	0.9096	0.9343	0.9362
Total HpCDF		1.1218	1.1655	1.2127	1.2857	1.2401
2,3,7,8-TCDF-13C		1.2774	1.2742	1.2612	1.2461	1.2611
2,3,7,8-TCDD-13C		1.0321	1.0459	1.0771	1.0111	1.0470
2,3,7,8-TCDD-37Cl4		0.8169	0.9323	0.9533	0.9783	1.0309
1,2,3,7,8-PeCDF-13C		1.0537	1.0775	1.0227	1.0200	1.0592
2,3,4,7,8-PeCDF-13C		1.0512	1.0726	1.0678	1.0115	1.0827
1,2,3,7,8-PeCDD-13C		0.7608	0.7921	0.7924	0.7409	0.7983
1,2,3,4,7,8-HxCDF-13C		1.1556	1.0886	0.9809	1.1450	1.1002
1,2,3,6,7,8-HxCDF-13C		1.2681	1.2256	1.0928	1.2756	1.2214
2,3,4,6,7,8-HxCDF-13C		1.1349	1.0734	0.9911	1.1211	1.0874
1,2,3,7,8,9-HxCDF-13C		1.0058	0.9854	0.8807	0.9933	0.9866
1,2,3,4,7,8-HxCDD-13C		1.0164	0.9810	0.8696	1.0258	1.0080
1,2,3,6,7,8-HxCDD-13C		1.1202	1.1043	1.0208	1.1355	1.1310
1,2,3,4,6,7,8-HpCDF-13C		1.2491	1.2217	1.0875	1.2280	1.2341
1,2,3,4,7,8,9-HpCDF-13C		0.9880	1.0006	0.8771	0.9634	1.0185
1,2,3,4,6,7,8-HpCDD-13C		1.0980	1.0766	0.9822	1.0556	1.0983
OCDD-13C		0.9188	0.9233	0.8338	0.9071	0.9535

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	F190508	Data Files:	Time	Injected	
Calibration Date	05/08/2019	CS-1	F190508A_04	11:43	SMT
Instrument	10MSHR05 (F)	CS-2	F190508A_03	11:02	SMT
Column Phase	ZB5-MS 0.25mm	CS-3	F190508A_02	10:00	SMT
Column ID No.	ZB5-MS-629919	CS-4	F190508A_06	13:46	SMT
		CS-5	F190508A_05	13:05	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.76	0.79	0.75	0.76	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.79	0.75	0.82	0.76	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF	1.54	1.53	1.61	1.54	1.58	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.55	1.54	1.32 - 1.78
1,2,3,7,8-PeCDD	0.55	0.62	0.61	0.61	0.62	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.30	1.29	1.28	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.22	1.30	1.21	1.26	1.24	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.27	1.19	1.22	1.24	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.43	1.23	1.26	1.21	1.23	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.26	1.33	1.23	1.24	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.23	1.25	1.21	1.22	1.22	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.25	1.26	1.21	1.22	1.19	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.05	1.00	1.01	1.02	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.94	1.06	1.03	1.03	1.03	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	0.95	1.04	1.00	1.00	1.04	0.88 - 1.20
OCDF	0.94	0.93	0.91	0.90	0.92	0.76 - 1.02
OCDD	0.86	0.86	0.88	0.89	0.88	0.76 - 1.02
1,2,3,4-TCDD-13C	0.79	0.79	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.25	1.24	1.25	1.24	1.21	1.05 - 1.43
2,3,7,8-TCDF-13C	0.76	0.77	0.78	0.75	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.77	0.78	0.78	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.61	1.56	1.57	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDD-13C	1.54	1.57	1.58	1.56	1.57	1.32 - 1.78
1,2,3,7,8-PeCDF-13C	1.56	1.58	1.56	1.58	1.54	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.51	0.52	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.54	0.51	0.50	0.53	0.52	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.52	0.51	0.53	0.53	0.53	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.51	0.53	0.53	0.54	0.52	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.24	1.26	1.25	1.26	1.24	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.23	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.43	0.44	0.45	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.45	0.44	0.45	0.45	0.44	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.01	1.03	1.03	1.03	1.06	0.88 - 1.20
OCDD-13C	0.89	0.91	0.88	0.91	0.90	0.76 - 1.02

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Method 1613B
Initial Calibration (ICAL) - Response Factor Summary

ICAL ID	Y190424	Data Files:			Time	Injected
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT	
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT	
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT	
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT	
		CS-5	Y190424A_04	10:17	SMT	
Isomer		CS-1	CS-2	CS-3	CS-4	CS-5
					Ave RF	%RSD
2,3,7,8-TCDF		0.8729	0.8432	0.8526	0.8809	0.8677
2,3,7,8-TCDD		0.8562	0.8631	1.0213	0.9314	0.9243
1,2,3,7,8-PeCDF		0.8497	0.8338	0.9059	0.8703	0.8977
2,3,4,7,8-PeCDF		0.9341	0.9523	0.9597	0.9958	1.0220
1,2,3,7,8-PeCDD		0.8708	0.8847	0.8802	0.8955	0.9296
1,2,3,4,7,8-HxCDF		1.1439	1.0967	1.1776	1.1920	1.2166
1,2,3,6,7,8-HxCDF		1.0426	1.0679	1.1267	1.1055	1.1348
2,3,4,6,7,8-HxCDF		1.1427	1.1191	1.1823	1.1952	1.1819
1,2,3,7,8,9-HxCDF		1.1115	1.0464	1.0803	1.1213	1.1439
1,2,3,4,7,8-HxCDD		0.8497	0.8896	0.9286	0.9506	0.9602
1,2,3,6,7,8-HxCDD		0.9208	0.9452	0.9241	0.9304	0.9459
1,2,3,7,8,9-HxCDD		0.8968	0.8994	0.9503	0.9396	0.9360
1,2,3,4,6,7,8-HpCDF		1.2000	1.2714	1.2416	1.2860	1.2831
1,2,3,4,7,8,9-HpCDF		1.2820	1.2744	1.2895	1.3181	1.3172
1,2,3,4,6,7,8-HpCDD		0.9267	0.9265	0.9872	1.0193	0.9930
OCDF		1.1150	1.0519	1.0618	1.1832	1.1582
OCDD		0.9688	0.9932	0.9766	1.0446	1.0045
Total PeCDF		0.8919	0.8930	0.9328	0.9331	0.9599
Total HxCDF		1.1101	1.0825	1.1417	1.1535	1.1693
Total HxCDD		0.8891	0.9114	0.9343	0.9402	0.9473
Total HpCDF		1.2410	1.2729	1.2655	1.3020	1.3002
2,3,7,8-TCDF-13C		1.4049	1.4326	1.4451	1.3939	1.4340
2,3,7,8-TCDD-13C		1.0663	1.1017	1.1494	1.0553	1.1115
2,3,7,8-TCDD-37Cl4		1.0375	1.0723	1.1203	1.0857	1.1501
1,2,3,7,8-PeCDF-13C		1.0503	1.0587	1.0139	1.0630	1.1470
2,3,4,7,8-PeCDF-13C		1.0164	1.0405	1.0773	1.0337	1.1320
1,2,3,7,8-PeCDD-13C		0.7177	0.7227	0.7651	0.7403	0.8302
1,2,3,4,7,8-HxCDF-13C		1.0423	1.0440	0.8810	1.0422	0.9857
1,2,3,6,7,8-HxCDF-13C		1.1538	1.1790	0.9850	1.1883	1.1393
2,3,4,6,7,8-HxCDF-13C		1.1032	1.0959	0.9475	1.1004	1.0598
1,2,3,7,8,9-HxCDF-13C		0.9479	0.9666	0.8920	0.9829	0.9583
1,2,3,4,7,8-HxCDD-13C		0.9555	0.9770	0.8521	0.9886	0.9648
1,2,3,6,7,8-HxCDD-13C		1.0622	1.0827	0.9902	1.0797	1.0742
1,2,3,4,6,7,8-HpCDF-13C		1.0365	1.0626	0.9680	1.0737	1.0649
1,2,3,4,7,8,9-HpCDF-13C		0.8316	0.8411	0.7866	0.8572	0.8769
1,2,3,4,6,7,8-HpCDD-13C		0.8976	0.9280	0.8651	0.9239	0.9580
OCDD-13C		0.6505	0.6988	0.6782	0.7086	0.7707
						0.7014
						6.37

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Method 1613B
Initial Calibration (ICAL) - Isotope Ratio Summary

ICAL ID	Y190424	Data Files:	Time	Injected	
Calibration Date	04/24/2019	CS-1	Y190424A_03	09:24	SMT
Instrument	10MSHR12 (Y)	CS-2	Y190424A_02	08:38	SMT
Column Phase	ZB-5MS 0.25mm	CS-3	Y190424A_01	07:53	SMT
Column ID No.	629920	CS-4	Y190424A_05	11:02	SMT
		CS-5	Y190424A_04	10:17	SMT

Isomer	CS-1	CS-2	CS-3	CS-4	CS-5	Limits
2,3,7,8-TCDF	0.83	0.83	0.77	0.77	0.78	0.65 - 0.89
2,3,7,8-TCDD	0.83	0.80	0.76	0.77	0.77	0.65 - 0.89
1,2,3,7,8-PeCDF	1.43	1.56	1.53	1.53	1.55	1.32 - 1.78
2,3,4,7,8-PeCDF	1.53	1.60	1.54	1.59	1.56	1.32 - 1.78
1,2,3,7,8-PeCDD	0.65	0.62	0.61	0.60	0.61	0.52 - 0.70
1,2,3,4,7,8-HxCDF	1.26	1.27	1.26	1.27	1.27	1.05 - 1.43
1,2,3,6,7,8-HxCDF	1.26	1.30	1.26	1.27	1.29	1.05 - 1.43
2,3,4,6,7,8-HxCDF	1.26	1.27	1.26	1.28	1.25	1.05 - 1.43
1,2,3,7,8,9-HxCDF	1.16	1.18	1.26	1.25	1.26	1.05 - 1.43
1,2,3,4,7,8-HxCDD	1.18	1.22	1.24	1.24	1.22	1.05 - 1.43
1,2,3,6,7,8-HxCDD	1.30	1.26	1.25	1.23	1.23	1.05 - 1.43
1,2,3,7,8,9-HxCDD	1.31	1.24	1.26	1.23	1.22	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF	1.14	1.11	1.04	1.04	1.03	0.88 - 1.20
1,2,3,4,7,8,9-HpCDF	0.96	1.11	1.00	1.05	1.02	0.88 - 1.20
1,2,3,4,6,7,8-HpCDD	1.03	1.05	1.05	1.03	1.05	0.88 - 1.20
OCDF	0.85	0.88	0.91	0.87	0.90	0.76 - 1.02
OCDD	0.76	0.91	0.88	0.88	0.89	0.76 - 1.02
1,2,3,4-TCDD-13C	0.78	0.78	0.79	0.78	0.80	0.65 - 0.89
1,2,3,7,8,9-HxCDD-13C	1.24	1.25	1.23	1.25	1.24	1.05 - 1.43
2,3,7,8-TCDF-13C	0.79	0.78	0.76	0.76	0.77	0.65 - 0.89
2,3,7,8-TCDD-13C	0.79	0.77	0.79	0.78	0.78	0.65 - 0.89
1,2,3,7,8-PeCDF-13C	1.53	1.56	1.55	1.56	1.57	1.32 - 1.78
2,3,4,7,8-PeCDF-13C	1.54	1.54	1.55	1.57	1.55	1.32 - 1.78
1,2,3,7,8-PeCDD-13C	1.56	1.55	1.59	1.59	1.61	1.32 - 1.78
1,2,3,4,7,8-HxCDF-13C	0.52	0.51	0.52	0.51	0.52	0.43 - 0.59
1,2,3,6,7,8-HxCDF-13C	0.52	0.51	0.54	0.51	0.51	0.43 - 0.59
2,3,4,6,7,8-HxCDF-13C	0.51	0.52	0.50	0.51	0.51	0.43 - 0.59
1,2,3,7,8,9-HxCDF-13C	0.52	0.53	0.52	0.50	0.50	0.43 - 0.59
1,2,3,4,7,8-HxCDD-13C	1.26	1.25	1.25	1.26	1.26	1.05 - 1.43
1,2,3,6,7,8-HxCDD-13C	1.23	1.21	1.22	1.25	1.24	1.05 - 1.43
1,2,3,4,6,7,8-HpCDF-13C	0.45	0.45	0.45	0.44	0.44	0.37 - 0.51
1,2,3,4,7,8-HpCDF-13C	0.44	0.45	0.46	0.44	0.45	0.37 - 0.51
1,2,3,4,6,7,8-HpCDD-13C	1.04	1.01	1.04	1.03	1.03	0.88 - 1.20
OCDD-13C	0.88	0.91	0.89	0.88	0.89	0.76 - 1.02

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-150
Filename F190508B_19
Injected By SMT
Analyzed 05/09/2019 04:26

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.78	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.79	0.65 - 0.89	102.3	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.55	1.32 - 1.78	100.1	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	91.4	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.25	1.05 - 1.43	93.2	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.23	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.05	0.88 - 1.20	94.8	72 - 138
OCDD-13C	M+2/M+4	0.90	0.76 - 1.02	178.9	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.76	0.65 - 0.89	99.6	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.58	1.32 - 1.78	94.8	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.56	1.32 - 1.78	99.1	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	92.2	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	90.0	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	90.5	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.51	0.43 - 0.59	90.9	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.46	0.37 - 0.51	92.1	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	91.2	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.4	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-150
Filename F190508B_19
Injected By SMT
Analyzed 05/09/2019 04:26

Instrument ID 10MSHR05 (F)
GC Column ID ZB5-MS-629919
ICAL ID F190508

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.76	0.65 - 0.89	11.0	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	51.8	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.24	1.05 - 1.43	50.8	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.20	1.05 - 1.43	51.4	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.22	1.05 - 1.43	52.3	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.03	0.88 - 1.20	51.8	43 - 58
OCDD	M+2/M+4	0.92	0.76 - 1.02	101.0	79 - 126
2,3,7,8-TCDF	M/M+2	0.76	0.65 - 0.89	9.5	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.57	1.32 - 1.78	54.3	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.59	1.32 - 1.78	50.8	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	49.7	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.25	1.05 - 1.43	51.0	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	51.2	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.27	1.05 - 1.43	50.8	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	1.02	0.88 - 1.20	52.2	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.04	0.88 - 1.20	50.1	43 - 58
OCDF	M+2/M+4	0.90	0.76 - 1.02	99.4	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Labeled Analytes**

Lab Name CS3/CPM-11321-150
Filename Y190509A_01
Injected By SMT
Analyzed 05/09/2019 07:41
Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
Labeled Compounds					
1,2,3,4-TCDD-13C	M/M+2	0.78	0.65 - 0.89	----	----
2,3,7,8-TCDD-13C	M/M+2	0.77	0.65 - 0.89	104.6	82 - 121
1,2,3,7,8-PeCDD-13C	M+2/M+4	1.56	1.32 - 1.78	99.4	62 - 160
1,2,3,4,7,8-HxCDD-13C	M+2/M+4	1.26	1.05 - 1.43	88.6	85 - 117
1,2,3,6,7,8-HxCDD-13C	M+2/M+4	1.23	1.05 - 1.43	93.6	85 - 118
1,2,3,7,8,9-HxCDD-13C	M+2/M+4	1.22	1.05 - 1.43	----	----
1,2,3,4,6,7,8-HpCDD-13C	M+2/M+4	1.00	0.88 - 1.20	106.0	72 - 138
OCDD-13C	M+2/M+4	0.87	0.76 - 1.02	200.2	96 - 415
2,3,7,8-TCDF-13C	M/M+2	0.75	0.65 - 0.89	98.4	71 - 140
1,2,3,7,8-PeCDF-13C	M+2/M+4	1.52	1.32 - 1.78	92.5	76 - 130
2,3,4,7,8-PeCDF-13C	M+2/M+4	1.57	1.32 - 1.78	97.5	77 - 130
1,2,3,4,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	86.7	76 - 131
1,2,3,6,7,8-HxCDF-13C	M/M+2	0.52	0.43 - 0.59	81.9	70 - 143
2,3,4,6,7,8-HxCDF-13C	M/M+2	0.54	0.43 - 0.59	83.8	73 - 137
1,2,3,7,8,9-HxCDF-13C	M/M+2	0.50	0.43 - 0.59	88.4	74 - 135
1,2,3,4,6,7,8-HpCDF-13C	M/M+2	0.45	0.37 - 0.51	102.5	78 - 129
1,2,3,4,7,8,9-HpCDF-13C	M/M+2	0.44	0.37 - 0.51	97.1	77 - 129
Cleanup Standard					
2,3,7,8-TCDD-37Cl4	M+2/M+4	(4)		10.0	7.9 - 12.7

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).
4. No ion abundance ratio; report concentration found.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

**Method 1613B Analysis Results
PCDD/PCDF Calibration Verification
Native Analytes**

Lab Name CS3/CPM-11321-150
Filename Y190509A_01
Injected By SMT
Analyzed 05/09/2019 07:41

Instrument ID 10MSHR12 (Y)
GC Column ID 629920
ICAL ID Y190424

Native Isomers	m/z's Forming Ratio (1)	Ion Abund. Ratio	QC Limits (2)	Conc Found	Conc. Range (ng/ml) (3)
2,3,7,8-TCDD	M/M+2	0.78	0.65 - 0.89	10.6	7.8 - 12.9
1,2,3,7,8-PeCDD	M+2/M+4	0.62	0.52 - 0.70	48.0	39 - 65
1,2,3,4,7,8-HxCDD	M+2/M+4	1.24	1.05 - 1.43	50.4	39 - 64
1,2,3,6,7,8-HxCDD	M+2/M+4	1.22	1.05 - 1.43	48.2	39 - 64
1,2,3,7,8,9-HxCDD	M+2/M+4	1.21	1.05 - 1.43	50.9	41 - 61
1,2,3,4,6,7,8-HpCDD	M+2/M+4	1.01	0.88 - 1.20	48.6	43 - 58
OCDD	M+2/M+4	0.89	0.76 - 1.02	98.4	79 - 126
2,3,7,8-TCDF	M/M+2	0.78	0.65 - 0.89	9.6	8.4 - 12.0
1,2,3,7,8-PeCDF	M+2/M+4	1.57	1.32 - 1.78	50.4	41 - 60
2,3,4,7,8-PeCDF	M+2/M+4	1.55	1.32 - 1.78	48.2	41 - 61
1,2,3,4,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	48.0	45 - 56
1,2,3,6,7,8-HxCDF	M+2/M+4	1.24	1.05 - 1.43	50.5	44 - 57
2,3,4,6,7,8-HxCDF	M+2/M+4	1.23	1.05 - 1.43	50.9	44 - 57
1,2,3,7,8,9-HxCDF	M+2/M+4	1.27	1.05 - 1.43	49.0	45 - 56
1,2,3,4,6,7,8-HpCDF	M+2/M+4	0.99	0.88 - 1.20	48.7	45 - 55
1,2,3,4,7,8,9-HpCDF	M+2/M+4	1.00	0.88 - 1.20	51.0	43 - 58
OCDF	M+2/M+4	0.94	0.76 - 1.02	91.7	63 - 159

1. See Table 8, Method 1613, for m/z specifications.
2. Ion Abundance Ratio Control Limits from Table 9, Method 1613.
3. Contract-required concentration range as specified in Table 6, Method 1613, under VER (10/94 Revision).

REPORT OF LABORATORY ANALYSIS

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Report Prepared for:

Benita Miller
Pace Analytical National
12065 Lebanon Road
Mount Juliet TN 37122

**REPORT OF
LABORATORY
ANALYSIS
FOR PFAAs**

Report Prepared Date:

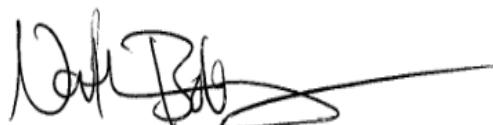
May 23, 2019

Report Information:

Pace Project #: 10472823
Sample Receipt Date: 04/30/2019
Client Project #: L1093333: WG1273455
Client Sub PO #: L1093333
State Cert #: 2926.01

Invoicing & Reporting Options:

This report has been reviewed by:



May 23, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

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The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on one sample submitted by a representative of ESC_TN. The samples were analyzed for one perfluorinated compound using a modified version of USEPA Method 537. Reporting limits were set to the quantitation limits.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

Laboratory spike samples were also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. The RPDs (relative percent differences) between one designated spike and its duplicate were within the method limits. These spikes indicate that the extraction process was performed as expected.

Recoveries for two of the three isotopically-labeled surrogate standards in the sample extracts were within the target ranges specified in the method. The 10472823001-R sample had a recovery for the surrogate labeled 13C2_PFHxA that was higher than the method limit (flagged "Fail"), which appears to be matrix related. However, this surrogate does not correlate with the analyte of interest and therefore no adverse impact is expected on the sample.

The 10472823001-R sample had a recovery for the labeled PFPrOPrA internal standard that was lower than the method limit, which appears to be matrix related. The affected target analytes for this sample are PFPrOPrA (GenX) and NaDONA. However, this internal standard does not correlate with the analyte of interest and therefore no adverse impact is expected on the sample.

Results for selected analytes were taken from secondary dilutions of the sample extracts in order to bring the results within the calibration range or to reduce the impact of matrix effects. The affected values were flagged "D" on the results tables.

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified. Results for the low level spikes that were below the calibration range were flagged "J".

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDEInterference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Sample ID Cross Reference

<u>Client Sample ID</u>	<u>Pace Sample ID</u>	<u>Date Received</u>	<u>Sample Type</u>
WW-20190426-002-DAY2	10472823001	04/30/2019	Water
WW-20190426-002-DAY2	10472823001-R	04/30/2019	Water

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Pace Analytical National	Address: 12065 Lebanon Road	Report To: Pace Analytical National Subout Team	Copy To:	Attention: Art Saunders	Company Name:
Mount Juliet, TN 37122				Address:	Regulatory Agency:
Email: SuboutTeam@pacenational.com	Phone: (615)773-9756	Purchase Order #: L1093333	Project Name: N/A	Pace Quote:	State/Location:
Fax: (615)756-5859			Project #: N/A	Pace Project Manager: Nathan Boberg	DE
Requested Due Date: 1-May				Pace Profile #: 38076	

Page : 1 Of 1

Requested Analysis Filtered (Y/N)

WO# : 10472823



10472823

# ITEM	SAMPLE ID <small>One Character per box. (A-Z, 0-9 / , -) Sample IDs must be unique</small>	MATRIX CODE <small>MATRIX CODE (see full code to left)</small>	COLLECTED				PRESERVATIVES	TESTS	RESULTS	
			START DATE	TIME	END DATE	TIME				
1	WW-20190426-002-DAY2	WT			26-Apr	6:36	4	4	Unseparated H2SO4	X
2									PFAS/PFOS & SOX & Dioxin and Furans	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

ADDITIONAL COMMENTS	RELIINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Pace Analytical National Batch: WG1273455	Benita Miller	29-Apr	16:49	<i>Howard Pace</i>	4/30/19	8:50	1.7 Y Y Y

Pace Analytical National SDGs: L1093333

Location: Minneapolis, MN 55414

PFAS/PFOS Method 537 and Dioxin and Furans by method 1613

SAMPLER NAME AND SIGNATURE		TEMP in C Received on ice (Y/N) Crucible Sealed Cooler (N/A) Samples In In (N/A)
PRINT Name of SAMPLER:		
SIGNATURE of SAMPLER:		
		DATE Signed:

<i>Pace Analytical</i>	Document Name: Sample Condition Upon Receipt Form	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: F-MN-L-213-rev.27	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt	Client Name: <i>Pace National</i>	Project #: WO# : 10472823
Courier:	<input checked="" type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input type="checkbox"/> Pace <input type="checkbox"/> SpeeDee <input type="checkbox"/> Commercial See Exception	PM: NB3 Due Date: 05/14/19 CLIENT: ESC_TN
Tracking Number:	4876 1094 9690	

Custody Seal on Cooler/Box Present? Yes No Seals Intact? Yes No Biological Tissue Frozen? Yes No N/A

Packing Material: Bubble Wrap Bubble Bags None Other: _____ Temp Blank? Yes No

Thermometer: T1(0461) T2(1336) T3(0459)
 T4(0254) T5(0048) Type of Ice: Wet Blue None Dry Melted

Note: Each West Virginia Sample must have temp taken (no temp blanks)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: 1.7 °C	Average Corrected Temp See Exceptions (no temp blank only): 1.7 °C
Correction Factor: True	Cooler Temp Corrected w/temp blank: 1.7 °C	

USDA Regulated Soil: N/A, water sample/Other: _____ Date/Initials of Person Examining Contents: **HT 4/30/19**
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, Did samples originate from a foreign source (internationally, including ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? Yes No Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	<input type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E. coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: See Exception <input type="checkbox"/>
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other		
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO ₃ <input type="checkbox"/> H ₂ SO ₄ <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH>9 Sulfide, NaOH>12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes Chlorine? <input type="checkbox"/> No pH Paper Lot#: <input type="checkbox"/> Res. Chlorine 0-6 Roll 0-6 Strip 0-14 Strip
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. See Exception <input type="checkbox"/>
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased): _____
Comments/Resolution: Samples collected in Texas.	Field Data Required? <input type="checkbox"/> Yes <input type="checkbox"/> No	

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: _____

Date/Time: _____

Comments/Resolution: Samples collected in Texas.

Field Data Required? Yes No

Project Manager Review: *Kirsten Haffey* Date: 5/1/2019
Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: *[Signature]*

QC Matric lot #: 187814
Time of Spiking: 05/08/19 10:30
SPE Cartridge: 5322-0024
Balance: 10BALQ

TRIZMA Lot #: 183004/18F285
Optima H2O Lot #: 187814
Methanol Lot #: 187805

Extract Start: 05/08/19 10:30
Extract End: 05/08/19 12:00
Setup By: PY

	Lot Number	Amount	Initials	Expiration	Dispenser	Witness
Internal	12332-184	100	PY	11/03/19	Q503	NH
Surrogate	12332-165	100	PY	10/19/19	Q523	NH
Native Lo	12332-167	10	PY	10/19/19	Q523	NH
Native Mid	12332-167	100	PY	10/19/19	Q523	NH
Native Hi						
GenX IS	12332-175	200	PY	10/25/19	Q497	NH

#	Sample ID	GenX IS	Surrogate	Natives	Full Bottle Weight	Empty Bottle Weight	Amount Extracted	Comments
1	BLANK-70381	X	X		293.8	37.4	256.4	
2	LCS-70382	X	X	X	280.6	36.7	243.9	
3	LCS-70383	X	X	X	287.0	36.7	250.3	
4	LCSD-70384	X	X	X	297.2	36.7	260.5	
5	10472941001-R	X	X		63.5	36.7	26.8	
6	10472941002-R	X	X		63.2	13.0	50.2	
7	10472552001-R	X	X		38.2	12.9	25.3	
8	10472552002-R	X	X		37.9	12.8	25.1	
9	10472552003-R	X	X		282.9	12.8	270.1	
10	10472552006-R	X	X		291.3	37.5	253.7	
11	10472823001-R	X	X		302.9	27.4	275.5	
12	10472825001-R	X	X		308.2	28.2	280.0	
13	10472552002-R-D	X	X		39.6	13.0	26.7	



EB-24552

Appendix B

Sample Analysis Summary

**Method 537 (Modified)**
Sample Analysis Summary

Client's Sample ID	WW-20190426-002-DAY2	Date Extracted	05/08/2019
Lab Sample ID	10472823001-R	Total Amount Extracted	276 mL
Filename	B190515C_004	ICAL ID	190515A02
Matrix	Industrial_Wate	Starting CCal	B190515C_002
Collected	04/26/2019	Ending CCal	B190515C_012
Received	04/30/2019	Method Blank Filename	B190510A_003

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	2100 D	170	57	100	05/17/201902:16	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	15	766	70 - 130	Fail
13C2_PFDA	2.0	1.4	70	70 - 130	Pass
d5-EtFOSAA	8.0	8.8	109	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	72225	87991 - 263973	106647 - 213294	Fail
d3-MeFOSAA	427685	178513 - 535540	221228 - 442455	Pass
13C2_PFOA	432146	209570 - 628710	298730 - 597461	Pass
13C4_PFOS	585135	280766 - 842297	409714 - 819429	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Appendix C

QC and Calibration Results Summary



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Method 537 (Modified) Blank Analysis Summary

Lab Sample ID	BLANK-70381	Total Amount Extracted	256 mL
Filename	B190510A_003	ICAL ID	190509B02
Matrix	Water	Starting CCal	B190510A_001
Date Extracted	05/08/2019	Ending CCal	B190510A_014

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFOS	ND	1.9	0.61	1	05/10/2019 10:14	1763-23-1	N2

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	85	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	6.7	84	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	155277	85724 - 257173	146887 - 293774	Pass
13C2_PFOA	457435	226773 - 680320	322102 - 644204	Pass
13C4_PFOS	641464	306835 - 920505	430300 - 860601	Pass
d3-MeFOSAA	169931	91759 - 275277	126038 - 252076	Pass

50-150% of Ical area

70-140% of the preceding CCV area

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70383	Matrix	Water
LCS Filename	B190510A_005	Dilution	1
Total Amount Extracted	250mL	Extracted	05/08/2019
ICAL ID	190509B02	Analyzed	05/10/2019 10:38
Start CCal Filename	B190510A_001	Injected By	WM
End CCal Filename	B190510A_014		
Method Blank Filename	B190510A_003		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	19	20	104	70.0 - 130.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	2.1	107	70 - 130	Pass
d5-EtFOSAA	8.0	7.4	93	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	167699	85724 - 257173	146887 - 293774	Pass
13C2_PFOA	422108	226773 - 680320	322102 - 644204	Pass
13C4_PFOS	572673	306835 - 920505	430300 - 860601	Pass
d3-MeFOSAA	163053	91759 - 275277	126038 - 252076	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-70382	Matrix	Water
LCS Filename	B190510C_022	Dilution	1
Total Amount Extracted	244mL	Extracted	05/08/2019
ICAL ID	190510B02	Analyzed	05/10/2019 23:05
Start CCAL Filename	B190510C_015	Injected By	WM
End CCAL Filename	B190510C_027		
Method Blank Filename	B190510A_003		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFOS	2.0	1.4 J	70	50.0 - 150.0

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.8	88	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	7.1	88	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	141325	72165 - 216496	99173 - 198347	Pass
13C2_PFOA	460611	232407 - 697222	321886 - 643773	Pass
13C4_PFOS	621549	311285 - 933856	420558 - 841116	Pass
d3-MeFOSAA	176764	95258 - 285775	133038 - 266077	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Laboratory Control Sample Duplicate (LCSD)

LCSD Lab Sample ID	LCSD-70384	LCS Filename	B190510C_022
LCSD Filename	B190510A_006	Matrix	Water
Total Amount Extracted	260mL	Dilution	1
ICAL ID	190509B02	Extracted	05/08/2019
Start CCal Filename	B190510A_001	Analyzed	05/10/2019 10:49
End CCal Filename	B190510A_014	Injected By	WM
Method Blank Filename	B190510A_003		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	RPD %
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PFOS	1.8	1.1 J	60	50.0 - 150.0	22
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Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.7	85	70 - 130	Pass
13C2_PFDA	2.0	1.9	97	70 - 130	Pass
d5-EtFOSAA	8.0	6.6	83	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPOPrA	160269	85724 - 257173	146887 - 293774	Pass
13C2_PFOA	477131	226773 - 680320	322102 - 644204	Pass
13C4_PFOS	656488	306835 - 920505	430300 - 860601	Pass
d3-MeFOSAA	171770	91759 - 275277	126038 - 252076	Pass

50-150% of Ical area

70-140% of the preceding CCV area

**PFAA Initial Calibration Response Factor Summary**

ICAL ID	190509B02	Data Files:	CS-1	B190509B_001	15:22
Calibration Date	05/09/2019		CS-2	B190509B_002	15:33
Instrument	10LCMS02		CS-3	B190509B_003	15:45
Column Phase	C18		CS-4	B190509B_004	15:57
Column ID No.	H18-061776		CS-5	B190509B_005	16:09
Analyst	NH		CS-6	B190509B_006	16:20

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	11000	10500	10400	10600	10800	11100	10700	0.999
13C2_PFOA	L	227000	229000	223000	226000	231000	225000	227000	1.000
13C4_PFOS	L	104000	108000	108000	105000	109000	107000	107000	1.000
d3-MeFOSAA	L	22500	23400	22100	22700	23700	23200	22900	0.999
13C2_PFHxA	L	1.24	1.26	1.27	1.24	1.26	1.27	1.26	1.000
13C2_PFDA	L	11.0	10.8	11.0	11.1	10.9	10.7	10.9	1.000
d5-EtFOSAA	L	0.974	0.939	0.962	0.943	0.976	0.887	0.947	0.999
PFBA	L	0.849	0.793	0.837	0.821	0.799	0.838	0.830	1.000
PFPeA	L	0.969	0.944	0.999	0.991	0.946	0.944	0.947	1.000
PFBS	L	0.484	0.454	0.476	0.473	0.470	0.484	0.481	1.000
PFHxA	L	1.03	1.00	1.03	0.996	1.00	0.942	0.957	0.999
PFPrOPrA	L	1.45	1.37	1.59	1.46	1.36	1.36	1.37	0.999
PFHpA	L	1.07	1.01	1.04	1.08	1.01	0.993	1.00	1.000
NaDONA	L	22.9	23.5	23.6	23.4	22.1	19.1	19.9	0.994
PFHxS	L	0.377	0.338	0.377	0.367	0.377	0.364	0.366	1.000
PFOA	L	0.981	0.957	0.976	0.948	0.966	0.916	0.928	1.000
PFNA	L	1.95	1.81	1.81	1.88	1.78	1.75	1.77	1.000
PFOS	L	1.05	0.983	0.962	1.03	1.00	1.01	1.01	1.000
PFDA	L	7.85	7.58	8.02	8.12	7.73	7.65	7.69	1.000
PFUdA	L	12.3	11.9	12.6	11.8	11.4	11.2	11.3	1.000
N-MeFOSAA	L	1.12	0.952	1.09	1.05	1.05	1.04	1.04	1.000
N-EtFOSAA	L	1.11	0.999	1.10	1.12	1.13	1.05	1.07	0.999
PFDS	L	4.99	4.87	5.23	5.01	5.08	4.99	5.01	1.000
PFDoA	L	7.42	6.95	7.52	7.35	7.13	7.07	7.10	1.000
PFTrDA	L	7.04	6.72	7.17	7.08	6.92	6.92	6.93	1.000
PFTeDA	L	2.77	2.57	2.54	2.50	2.56	2.55	2.55	1.000
PFHxDA	L	4.08	4.21	3.69	3.70	3.69	3.66	3.67	1.000
PFODA	L	2.27	2.05	2.13	2.11	2.11	2.17	2.16	1.000

Slope: Linear calibration



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PFAA Initial Calibration Recovery Summary

ICAL ID	190509B02	Data Files:	CS-1	B190509B_001	15:22
Calibration Date	05/09/2019		CS-2	B190509B_002	15:33
Instrument	10LCMS02		CS-3	B190509B_003	15:45
Column Phase	C18		CS-4	B190509B_004	15:57
Column ID No.	H18-061776		CS-5	B190509B_005	16:09
Analyst	NH		CS-6	B190509B_006	16:20

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	102	98	97	99	100	104
13C2_PFOA	100	101	98	100	102	99
13C4_PFOS	97	101	101	99	102	100
d3-MeFOSAA	98	102	96	99	103	101
13C2_PFHxA	99	100	101	99	100	101
13C2_PFDA	101	99	101	101	100	98
d5-EtFOSAA	103	99	102	100	103	94
PFBA	102	96	101	99	96	101
PFPeA	102	100	105	105	100	100
PFBS	101	94	99	98	98	101
PFHxA	108	105	107	104	105	98
PFPrOPrA	106	100	116	107	99	99
PFHpA	107	101	103	108	101	99
NaDONA	115	118	119	117	111	96
PFHxS	103	92	103	100	103	99
PFOA	106	103	105	102	104	99
PFNA	110	102	103	106	101	99
PFOS	104	97	95	102	99	100
PFDA	102	99	104	106	101	99
PFUdA	109	105	111	104	101	99
N-MeFOSAA	107	91	104	100	101	100
N-EtFOSAA	103	93	103	104	106	98
PFDS	99	97	104	100	101	100
PFDoA	105	98	106	104	100	100
PFTrDA	102	97	103	102	100	100
PFTeDA	109	101	100	98	100	100
PFHxDA	111	115	100	101	100	100
PFODA	105	95	99	98	98	101



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Method 537 (Modified) Calibration Verification Summary
ICV

Lab Calibration ID ICV-12332-185
Run File Name B190509B_008
Injected By WM
Analyzed 05/09/2019 16:44
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190509B02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	97	50.0-150.0	494162

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	1.9	93	70 - 130	Pass
d5-EtFOSAA	8.0	7.5	94	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPnOPrA	146739	85724 - 257173	---	Pass
13C2_PFOA	438498	226773 - 680320	---	Pass
13C4_PFOS	603590	306835 - 920505	---	Pass
d3-MeFOSAA	184461	91759 - 275277	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area

PFAA Initial Calibration Response Factor Summary

ICAL ID	190510B02	Data Files:	CS-1	B190510B_009	18:23
Calibration Date	05/10/2019		CS-2	B190510B_003	17:13
Instrument	10LCMS02		CS-3	B190510B_004	17:25
Column Phase			CS-4	B190510B_005	17:36
Column ID No.			CS-5	B190510B_006	17:48
Analyst	WM		CS-6	B190510B_007	18:00

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R ²
13C3_PFPrOPrA	L	8820	9280	9450	9250	8340	8990	9020	0.998
13C2_PFOA	L	236000	235000	239000	232000	224000	228000	232000	1.000
13C4_PFOS	L	110000	108000	110000	110000	106000	107000	108000	1.000
d3-MeFOSAA	L	21600	23800	24800	24000	24600	24100	23800	0.998
13C2_PFHxA	L	1.21	1.23	1.27	1.24	1.31	1.25	1.25	0.999
13C2_PFDA	L	11.5	11.6	10.8	11.4	11.2	10.6	11.2	0.999
d5-EtFOSAA	L	0.932	0.957	0.907	0.935	0.882	0.863	0.913	0.999
PFBA	L	0.876	0.769	0.813	0.808	0.841	0.805	0.812	1.000
PFPeA	L	1.02	0.939	0.963	1.00	1.01	0.949	0.963	0.999
PFBS	L	0.507	0.433	0.466	0.470	0.478	0.467	0.469	1.000
PFHxA	L	1.20	1.11	1.08	1.02	1.06	0.959	0.983	0.998
PFPrOPrA	L	1.75	1.51	1.62	1.75	1.67	1.66	1.66	1.000
PFHpA	L	1.06	1.02	1.05	1.06	1.05	0.995	1.01	0.999
NaDONA	L	30.3	26.8	27.7	28.5	29.2	0.000	29.0	1.000
PFHxS	L	0.374	0.338	0.369	0.377	0.372	0.365	0.367	1.000
PFOA	L	1.00	0.957	0.931	0.950	0.974	0.925	0.935	1.000
PFNA	L	1.78	1.79	1.95	1.93	1.87	1.73	1.77	0.999
PFOS	L	1.06	1.01	0.990	0.968	0.984	0.975	0.977	1.000
PFDA	L	8.37	7.47	7.94	8.17	7.78	7.57	7.64	1.000
PFUdA	L	12.5	11.5	12.0	12.3	11.2	10.8	11.0	0.999
N-MeFOSAA	L	0.941	0.968	1.08	1.06	1.02	1.03	1.03	1.000
N-EtFOSAA	L	1.13	1.07	1.16	1.11	1.07	1.06	1.06	1.000
PFDS	L	5.31	4.50	4.49	4.57	4.55	4.49	4.51	1.000
PFDoA	L	7.63	7.87	7.30	7.43	7.24	6.81	6.93	0.999
PFTrDA	L	7.18	7.66	7.26	7.52	7.17	7.05	7.10	1.000
PFTeDA	L	2.42	2.52	2.48	2.61	2.47	2.52	2.52	1.000
PFHxDA	L	3.71	3.56	3.58	3.77	3.72	3.67	3.68	1.000
PFODA	L	2.10	1.97	2.10	2.20	2.10	2.01	2.04	0.999

Slope: Linear calibration



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PFAA Initial Calibration Recovery Summary

ICAL ID	190510B02	Data Files:	CS-1	B190510B_009	18:23
Calibration Date	05/10/2019		CS-2	B190510B_003	17:13
Instrument	10LCMS02		CS-3	B190510B_004	17:25
Column Phase			CS-4	B190510B_005	17:36
Column ID No.			CS-5	B190510B_006	17:48
Analyst	WM		CS-6	B190510B_007	18:00

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPrOPrA	98	103	105	103	92	100
13C2_PFOA	102	101	103	100	96	98
13C4_PFOS	101	100	101	101	98	99
d3-MeFOSAA	91	100	104	101	103	101
13C2_PFHxA	97	98	101	99	105	100
13C2_PFDA	103	104	97	102	100	94
d5-EtFOSAA	102	105	99	102	97	95
PFBA	108	95	100	100	104	99
PFPeA	106	97	100	104	105	99
PFBS	108	92	99	100	102	100
PFHxA	122	113	110	104	108	98
PFPrOPrA	105	91	97	105	100	100
PFHpA	105	101	104	105	104	99
NaDONA	105	92	96	98	101	0
PFHxS	102	92	100	103	101	99
PFOA	107	102	100	102	104	99
PFNA	101	101	110	109	106	98
PFOS	109	104	101	99	101	100
PFDA	110	98	104	107	102	99
PFUdA	114	105	109	112	102	99
N-MeFOSAA	92	94	105	103	99	100
N-EtFOSAA	106	100	109	105	101	99
PFDS	118	100	100	101	101	100
PFDoA	110	114	105	107	104	98
PFTrDA	101	108	102	106	101	99
PFTeDA	96	100	98	104	98	100
PFHxDA	101	97	97	102	101	100
PFODA	103	97	103	108	103	99



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Method 537 (Modified) Calibration Verification Summary
ICV

Lab Calibration ID ICV-12332-185
Run File Name B190510B_011
Injected By WM
Analyzed 05/10/2019 18:47
Instrument ID 10LCMS02
Column ID
Ical ID 190510B02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	100	50.0-150.0	500481

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	101	70 - 130	Pass
13C2_PFDA	2.0	2.1	106	70 - 130	Pass
d5-EtFOSAA	8.0	8.8	111	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	143175	72165 - 216496	---	Pass
13C2_PFOA	430803	232407 - 697222	---	Pass
13C4_PFOS	615956	311285 - 933856	---	Pass
d3-MeFOSAA	160615	95258 - 285775	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area

PFAA Initial Calibration Response Factor Summary

ICAL ID	190515A02	Data Files:	CS-1	B190515A_017	13:00
Calibration Date	05/15/2019		CS-2	B190515A_018	13:12
Instrument	10LCMS02		CS-3	B190515A_019	13:24
Column Phase	C18		CS-4	B190515A_020	13:35
Column ID No.	H18-061776		CS-5	B190515A_021	13:47
Analyst	NH		CS-6	B190515A_022	13:59

Response Factors

Compound	Type	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	Slope	R²
13C3_PFPPOPrA	L	10400	11000	11600	11500	10400	11100	11000	0.998
13C2_PFOA	L	212000	210000	212000	207000	216000	199000	210000	0.999
13C4_PFOS	L	97900	99400	102000	97800	97100	93200	97800	0.999
d3-MeFOSAA	L	45000	46000	43500	44400	45500	43400	44600	1.000
13C2_PFHxA	L	1.12	1.17	1.13	1.15	1.13	1.17	1.14	1.000
13C2_PFDA	L	5.83	5.32	5.69	5.64	5.93	5.50	5.65	0.999
d5-EtFOSAA	L	0.960	0.911	1.01	0.942	0.903	0.873	0.932	0.998
PFBA	L	0.739	0.742	0.707	0.718	0.686	0.735	0.725	0.999
PPPeA	L	0.857	0.832	0.877	0.900	0.853	0.885	0.880	1.000
PFBS	L	0.446	0.466	0.456	0.460	0.442	0.472	0.466	0.999
PFHxA	L	0.953	0.897	0.912	0.917	0.902	0.914	0.912	1.000
PFPrOPrA	L	1.64	1.45	1.46	1.39	1.52	1.47	1.48	1.000
PFHpA	L	0.998	0.992	1.00	0.998	0.963	0.976	0.975	1.000
NaDONA	L	22.8	21.7	20.4	19.4	20.7	18.3	18.9	0.997
PFHxS	L	0.362	0.361	0.348	0.358	0.368	0.374	0.372	1.000
PFOA	L	0.935	0.981	0.950	0.971	0.900	0.946	0.938	1.000
PFNA	L	1.96	1.82	1.86	1.94	1.86	1.84	1.85	1.000
PFOS	L	0.984	0.939	0.994	0.987	1.01	1.01	1.01	1.000
PFDA	L	4.28	4.38	4.15	4.10	4.09	4.05	4.06	1.000
PFUdA	L	7.36	6.35	7.29	6.82	6.74	6.08	6.25	0.998
N-MeFOSAA	L	0.993	0.975	1.12	1.02	1.02	1.02	1.02	1.000
N-EtFOSAA	L	1.15	1.13	1.19	1.17	1.17	1.08	1.11	0.999
PFDS	L	2.40	2.38	2.52	2.49	2.38	2.49	2.47	1.000
PFDoA	L	4.52	4.40	4.70	4.54	4.26	4.42	4.40	1.000
PFTrDA	L	4.49	4.34	4.67	4.52	4.34	4.52	4.48	1.000
PFTeDA	L	1.62	1.50	1.67	1.63	1.58	1.59	1.59	1.000
PFHxDA	L	2.82	2.69	2.60	2.56	2.48	2.59	2.57	1.000
PFODA	L	1.51	1.39	1.44	1.51	1.45	1.57	1.54	0.999

Slope: Linear calibration



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PFAA Initial Calibration Recovery Summary

ICAL ID	190515A02	Data Files:	CS-1	B190515A_017	13:00
Calibration Date	05/15/2019		CS-2	B190515A_018	13:12
Instrument	10LCMS02		CS-3	B190515A_019	13:24
Column Phase	C18		CS-4	B190515A_020	13:35
Column ID No.	H18-061776		CS-5	B190515A_021	13:47
Analyst	NH		CS-6	B190515A_022	13:59

%Recoveries

Compound	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6
13C3_PFPPOPrA	95	100	106	104	95	101
13C2_PFOA	101	100	101	99	103	95
13C4_PFOS	100	102	104	100	99	95
d3-MeFOSAA	101	103	98	99	102	97
13C2_PFHxA	98	102	99	101	99	102
13C2_PFDA	103	94	101	100	105	97
d5-EtFOSAA	103	98	108	101	97	94
PFBA	102	102	98	99	95	101
PFPeA	97	95	100	102	97	101
PFBS	96	100	98	99	95	101
PFHxA	105	98	100	101	99	100
PFPrOPrA	111	98	99	94	103	100
PFHpA	102	102	103	102	99	100
NaDONA	121	115	108	103	110	97
PFHxS	97	97	94	96	99	101
PFOA	100	105	101	104	96	101
PFNA	106	98	101	105	101	99
PFOS	98	93	99	98	100	100
PFDA	105	108	102	101	101	100
PFUdA	118	102	117	109	108	97
N-MeFOSAA	97	95	110	100	100	100
N-EtFOSAA	104	102	108	106	106	98
PFDS	97	96	102	101	97	101
PFDoA	103	100	107	103	97	100
PFTrDA	100	97	104	101	97	101
PFTeDA	102	94	105	102	99	100
PFHxDA	110	105	101	99	96	101
PFODA	98	91	93	98	94	102



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Method 537 (Modified) Calibration Verification Summary ICV

Lab Calibration ID ICV-12332-185
Run File Name B190515A_024
Injected By WM
Analyzed 05/15/2019 14:22
Instrument ID 10LCMS02
Column ID H18-061776
Ical ID 190515A02

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	19	19	98	50.0-150.0	459614

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	8.0	101	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	175893	87991 - 263973	---	Pass
13C2_PFOA	408510	209570 - 628710	---	Pass
13C4_PFOS	555795	280766 - 842297	---	Pass
d3-MeFOSAA	347544	178513 - 535540	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-186-01	Instrument ID	10LCMS02
Run File Name	B190510A_001	Column ID	H18-061776
Injected By	WM	Ical ID	190509B02
Analyzed	05/10/2019 09:51	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	1.9	101	50.0-150.0	52361

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	101	70 - 130	Pass
13C2_PFDA	2.0	2.0	101	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	97	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	209839	85724 - 257173	---	Pass
13C2_PFOA	460145	226773 - 680320	---	Pass
13C4_PFOS	614715	306835 - 920505	---	Pass
d3-MeFOSAA	180054	91759 - 275277	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-186-03	Instrument ID	10LCMS02
Run File Name	B190510A_014	Column ID	H18-061776
Injected By	WM	Ical ID	190509B02
Analyzed	05/10/2019 12:23	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.2	96	70.0-130.0	258260

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.1	103	70 - 130	Pass
13C2_PFDA	2.0	2.1	106	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	97	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	170208	85724 - 257173	146887 - 293774	Pass
13C2_PFOA	460059	226773 - 680320	322102 - 644204	Pass
13C4_PFOS	638000	306835 - 920505	430300 - 860601	Pass
d3-MeFOSAA	187232	91759 - 275277	126038 - 252076	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-186-05	Instrument ID	10LCMS02
Run File Name	B190510C_015	Column ID	
Injected By	WM	Ical ID	190510B02
Analyzed	05/10/2019 21:43	Level	High

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	38	42	109	70.0-130.0	1064301

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	101	70 - 130	Pass
13C2_PFDA	2.0	1.9	96	70 - 130	Pass
d5-EtFOSAA	8.0	7.8	97	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	141676	72165 - 216496	103649 - 207299	Pass
13C2_PFOA	459838	232407 - 697222	324995 - 649989	Pass
13C4_PFOS	600797	311285 - 933856	443011 - 886023	Pass
d3-MeFOSAA	190055	95258 - 285775	124258 - 248516	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-186-01	Instrument ID	10LCMS02
Run File Name	B190510C_027	Column ID	
Injected By	WM	Ical ID	190510B02
Analyzed	05/11/2019 00:04	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	2.0	102	50.0-150.0	53904

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	96	70 - 130	Pass
13C2_PFDA	2.0	1.9	94	70 - 130	Pass
d5-EtFOSAA	8.0	8.4	105	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPrA	172897	72165 - 216496	99173 - 198347	Pass
13C2_PFOA	482120	232407 - 697222	321886 - 643773	Pass
13C4_PFOS	645153	311285 - 933856	420558 - 841116	Pass
d3-MeFOSAA	192784	95258 - 285775	133038 - 266077	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-186-01	Instrument ID	10LCMS02
Run File Name	B190515C_002	Column ID	H18-061776
Injected By	WM	Ical ID	190515A02
Analyzed	05/16/2019 01:53	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	1.7	90	50.0-150.0	41763

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	97	70 - 130	Pass
13C2_PFDA	2.0	2.2	109	70 - 130	Pass
d5-EtFOSAA	8.0	8.5	107	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	152353	87991 - 263973	---	Pass
13C2_PFOA	403330	209570 - 628710	---	Pass
13C4_PFOS	548289	280766 - 842297	---	Pass
d3-MeFOSAA	316039	178513 - 535540	---	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-186-03	Instrument ID	10LCMS02
Run File Name	B190515C_012	Column ID	H18-061776
Injected By	WM	Ical ID	190515A02
Analyzed	05/16/2019 03:51	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.7	101	70.0-130.0	225391

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	101	70 - 130	Pass
13C2_PFDA	2.0	2.0	99	70 - 130	Pass
d5-EtFOSAA	8.0	7.7	97	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	160087	87991 - 263973	106647 - 213294	Pass
13C2_PFOA	394852	209570 - 628710	282331 - 564662	Pass
13C4_PFOS	530092	280766 - 842297	383802 - 767605	Pass
d3-MeFOSAA	345031	178513 - 535540	221228 - 442455	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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**Method 537 (Modified) Calibration Verification Summary
CCV**

Lab Calibration ID	CAL-12332-186-01	Instrument ID	10LCMS02
Run File Name	B190516E_002	Column ID	H18-061776
Injected By	WM	Ical ID	190515A02
Analyzed	05/17/2019 01:52	Level	Low

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	1.9	1.8	94	50.0-150.0	46551

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	1.9	95	70 - 130	Pass
13C2_PFDA	2.0	2.3	113	70 - 130	Pass
d5-EtFOSAA	8.0	8.7	109	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPPrOPrA	207736	87991 - 263973	149387 - 298773	Pass
13C2_PFOA	426758	209570 - 628710	301590 - 603181	Pass
13C4_PFOS	585306	280766 - 842297	402348 - 804697	Pass
d3-MeFOSAA	333773	178513 - 535540	248040 - 496079	Pass

50-150% of Ical area

70-140% of the preceding CCV area



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Method 537 (Modified) Calibration Verification Summary CCV

Lab Calibration ID	CAL-12332-186-03	Instrument ID	10LCMS02
Run File Name	B190516E_038	Column ID	H18-061776
Injected By	WM	Ical ID	190515A02
Analyzed	05/17/2019 08:55	Level	Mid

Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Area
PFOS	9.6	9.3	97	70.0-130.0	240599

Surrogate Standards

SS Compound	Spiked	Found	%Recovery	Limits	Pass/Fail
13C2_PFHxA	2.0	2.0	98	70 - 130	Pass
13C2_PFDA	2.0	2.1	103	70 - 130	Pass
d5-EtFOSAA	8.0	8.7	109	70 - 130	Pass

Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C3_PFPtOPtA	192251	87991 - 263973	145415 - 290831	Pass
13C2_PFOA	419272	209570 - 628710	298730 - 597461	Pass
13C4_PFOS	587621	280766 - 842297	409714 - 819429	Pass
d3-MeFOSAA	347485	178513 - 535540	233641 - 467282	Pass

50-150% of Ical area

70-140% of the preceding CCV area